Claims

1. Apparatus for mixing of a chemical medium in gaseous or liquid state with a pulp suspension, comprising a housing having a wall (2) that defines a mixing chamber (4), a first feeder (6) for feeding the pulp suspension to the mixing chamber, a rotor shaft (8, 104, 204, 300, 406, 502), that extends in the mixing chamber, a drive device for rotation of the rotor shaft, a rotor body (10, 200, 407, 504), that is connected to the rotor shaft and arranged to supply kinetic energy to the pulp suspension flow, during rotation of the rotor shaft by the rotation of the drive device, such that turbulence is produced in a turbulent flow zone (12) in the mixing chamber, a second feeder (13) for feeding of the chemical medium to the mixing chamber, and an outlet for discharging the mixture of chemical medium and pulp suspension from the mixing chamber, **characterised in** that the second feeder (13) comprises at least one stationary feeding pipe (14, 102), that extends from the wall (2) of the housing into the mixing chamber (4) and that has an outlet (16, 100) for the chemical medium in or in close vicinity to said turbulent flow zone (12).

2. Apparatus according to claim 1, **characterised in** that the feeding pipe (14) extend substantially radial to the rotor shaft (8, 204, 300, 406, 502) in the mixing chamber (4).

3. Apparatus according to claim 1, **characterised in** that the feeding pipe (14, 102) extend substantially parallel to the rotor shaft (8, 104, 204, 300, 406, 502) in the mixing chamber (4).

4. Apparatus according to claim 3, **characterised in** that the rotor shaft (104, 204, 300, 406, 502) extends through the feeding pipe (102), whereby an annular outlet (100) for the chemical medium is defined by the rotor shaft and the feeding pipe.

5. Apparatus according to claim 4, **characterised in** that the feeding pipe (102) extend coaxially or eccentrically to the rotor shaft (104, 204, 300, 406, 502).

6. Apparatus according to claim 1 or 2, **characterised in** that the outlet (16, 100) of the feeding pipe is of rotational symmetrical design.

7. Apparatus according to claim 6, **characterised in** that the outlet (16, 100) of the feeding pipe has circular form.

8. Apparatus according to claim 1 or 2, **characterised in** that the outlet (16, 100) of the feeding pipe has elliptical, triangular, or rectangular form.

9. Apparatus according to claim 1, **characterised in** that the second feeder (13) comprises a number of stationary feeding pipes (14).

10. Apparatus according to claim 9, **characterised in** that the feeding pipes (14) extend substantially radial to the rotor shaft (8, 204, 300, 406, 502).

11. Apparatus according to claim 9, **characterised in** that the feeding pipes (14) extend substantially parallel to the rotor shaft (8, 204, 300, 406, 502).

12. Apparatus according to claim 10 or 11, **characterised in** that the outlets (16) of the feeding pipes (14) are situated symmetrical or asymmetrical around the rotor shaft (8, 204, 300, 406, 502).

13. Apparatus according to any of claims 9-12, **characterised in** that the outlets (16) of each of the feeding pipes (14) are of a rotational symmetrical design.

14. Apparatus according to claim 13, **characterised in** that each feeding pipe (14) has a circular form.

15. Apparatus according to any of claims 9-12, **characterised in** that the outlets (16) of each of the feeding pipes (14) are of a non-rotational symmetrical design.

16. Apparatus according to claim 12, **characterised in** that the outlets (16) of each of the feeding pipes (14) are of a non-rotational symmetrical design and at least one of the outlets (16) is provided with an orientation of rotation (V1) in relation to the centre (8) of rotor shaft that differs from the corresponding orientations of rotation (V2) of the other outlets.

17. Apparatus according to claim 15 or 16, **characterised in** that the outlet (16, 100) of each feeding pipe has elliptical, triangular, or rectangular form.

18. Apparatus according to any of claims 1-17, **characterised in** that the rotor body (10, 200, 407, 504) comprise a number of rotor pins (202, 408, 506, 506'), which extends from the rotor shaft (8, 104, 204, 300, 406, 502).

19. Apparatus according to claim 18, **characterised in** that each rotor pin (202, 408, 506, 506´) is curved forward from the rotor shaft (8, 104, 204, 300, 406, 502) or backward relatively to the rotational direction of the rotor body.

20. Apparatus according to claim 18 or 19, **characterised in** that each rotor pin (202, 408, 506, 506´) has a width (b), as seen in the rotational direction of the rotor body (10, 200, 407, 504), that increase along at least a part of the rotor body in direction against the rotor shaft (8, 104, 204, 300, 406, 502).

21. Apparatus according to any of claims 18-20, **characterised in** that each rotor pin (202, 408, 506, 506´) has a circular, quadratic or shovel-shaped cross-section.

22. Apparatus according to any of claims 18-20, **characterised in** that each rotor pin (202, 408, 506, 506´) has a helix shape.

23. Apparatus according to claim 22, **characterised in** that each rotor pin (202, 408, 506, 506´) has a quadratic cross-section.

24. Apparatus according to any of claims 1-3 or 6-23, **characterised in** that the rotor shaft (8, 204, 300, 406, 502) is provided with an axially flow generating element (302).

25. Apparatus according to claim 24, **characterised in** that the axial flow-generating element (302) comprise a number

of blades (304), which are obliquely attached relatively to the rotor shaft (8, 204, 300, 406, 502).

26. Apparatus according to claim 24, **characterised in** that the axial flow-generating element (302) comprise a screw thread or a band thread (306), which extends along the rotor shaft (8, 204, 300, 406, 502).

27. Apparatus according to any of claims 4 or 5, **characterised in** that the rotor shaft (8, 104, 204, 300, 406, 502) is provided with an axially flow generating element (302).

28. Apparatus according to claim 27, **characterised in** that the axial flow-generating element (302) comprise a screw thread or a band thread (306), which extends along the rotor shaft (8, 104, 300, 406, 502).

29. Apparatus according to any of claims 1-28, **characterised in** that a flow-restraining disk (400, 500) with one or more flow passages (402, 510) is arranged to temporarily increase the flow velocity of the pulp suspension when the pulp suspension passes the flow-restraining disk.

30. Apparatus according to claim 29, **characterised in** that each flow passage (402, 510) extend obliquely from the up-stream side of the disk against the centre shaft (C) of the disk.

31. Apparatus according to claim 29 or 30, **characterised in** that the flow area (A) of each flow passage (402, 510) increases or decreases in the direction of the flow.

32. Apparatus according to any of claims 29-31, **characterised in** that the disk is provided with a plurality of flow passages (402, 510) that form a Cartesian or polar pattern.

33. Apparatus according to any of claims 29-32, **characterised in** that the disk (400, 500) is circular or coaxial to the rotor shaft (8, 104, 204, 300, 406, 502).

34. Apparatus according to any of claims 29-33, **characterised in** that the disk (400, 500) is stationary arranged in the housing.

35. Apparatus according to claim 34, **characterised in** that the disk (400, 500) comprise a number of concentrically rings (404, 508), which are coaxial with the rotor shaft (8, 104, 204, 300, 406, 502), and at least one radial bar (410), that fixates the rings relatively each other and that are attached in the wall of the housing, whereby the flow passages (402, 510) are defined by the rings and the bar.

36. Apparatus according to any of claims 29-33, **characterised in** that the disk (400, 500) is integrated with the rotor shaft (8, 104, 204, 300, 406, 502).

37. Apparatus according to claim 36, **characterised in** that the rotor body (10, 200, 407, 504) comprise a number of pins (202, 408, 506, 506'), that extends from the rotor shaft (8, 104, 204, 300, 406, 502), whereby the disk (400, 500) is fixed to the pins on the down-stream side of the rotor body.

38. Apparatus according to claim 37, **characterised in** that the rotor body (10, 200, 407, 504) comprise an additional number of pins (202, 408, 506, 506´), that extends from the rotor shaft (8, 104, 204, 300, 406, 502) on the down-stream side of the disk, whereby the disk (400, 500) is also fixed to said additional pins (202, 408, 506, 506´).

39. Apparatus according to claim 37 or 38, **characterised in** that the disk (400, 500) comprise a number of concentrically rings (404, 508), which are coaxial with the rotor shaft (8, 104, 204, 300, 406, 502), and the rotor pins (202, 408, 506, 506´) fixates the rings in relation to each other, whereby flow passages (402, 510) are defined by the pins and the rings.

40 Apparatus according to any of claims 36-39, **characterised in** that spacer elements (511) are arranged between the disk (400, 500) and the rotor pins (202, 408, 506, 506´).